Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in this application:

Listing of Claims:

Claims 1-14. (Cancelled)

Claim 15. (Previously Presented): A method for improving an immune response to a vaccine antigen in a patient, comprising:

reactivating the thymus of the patient; and

administering a vaccine to the patient, the vaccine comprising a vaccine antigen,

wherein the patient develops an immune response to the vaccine antigen.

Claim 16. (Withdrawn): The method of claim 15, wherein the thymus of the patient has been at least in part atrophied before it is reactivated.

Claim 17. (Withdrawn): The method of claim 16, wherein the patient has a disease that at least in part atrophied the thymus of the patient.

Claim 18. (Withdrawn): The method of claim 16, wherein the patient has had a treatment of a disease that at least in part atrophied the thymus of the patient.

Claim 19. (Withdrawn): The method of claim 18, wherein the treatment is immunosuppression, chemotherapy, or radiation treatment.

Claim 20. (Withdrawn): The method of claim 16, wherein the patient is post-pubertal.

Claim 21. (Withdrawn): The method of claim 15, further comprising administering cells to the patient, wherein the cells are stem cells, progenitor cells, or combinations thereof.

Claim 22. (Withdrawn): The method of claim 21, wherein the stem cells are selected from the group consisting of hematopoietic stem cells, epithelial stem cells, and combinations thereof.

Claim 23. (Withdrawn): The method of claim 21, wherein the progenitor cells are selected from the group consisting of lymphoid progenitor cells, myeloid progenitor cells, and combinations thereof.

Claim 24. (Cancelled)

Claim 25. (Withdrawn): The method of claim 22, wherein the cells are hematopoietic stem cells.

Claim 26. (Withdrawn): The method of claim 25, wherein the hematopoietic stem cells are $CD34^+$.

Claim 27. (Withdrawn): The method of claim 21, wherein the cells are autologous.

Claim 28. (Withdrawn): The method of claim 21, wherein the cells are not autologous.

Claim 29. (Withdrawn): The method of claim 25, wherein the hematopoietic stem cells are administered when the thymus begins to reactivate.

Claim 30. (Previously Presented): The method of claim 15, wherein the thymus is reactivated by disruption of sex steroid-mediated signaling to the thymus.

Claim 31. (Previously Presented): The method of claim 30, further comprising administering cells to the patient, wherein the cells are stem cells, progenitor cells, or combinations thereof.

Claim 32. (Previously Presented): The method of claim 31, wherein the stem cells are selected from the group consisting of hematopoietic stem cells, epithelial stem cells, and combinations thereof.

Claim 33. (Previously Presented): The method of claim 31, wherein the progenitor cells are selected from the group consisting of lymphoid progenitor cells, myeloid progenitor cells, and combinations thereof.

Claim 34. (Cancelled)

Claim 35. (Previously Presented): The method of claim 32, wherein the cells are hematopoietic stem cells.

Claim 36. (Previously Presented): The method of claim 31, wherein the cells are administered at the time disruption of sex steroid-mediated signaling to the thymus is begun.

Claim 37. (Withdrawn): The method of claim 30, wherein the sex steroid-mediated signaling to the thymus is disrupted by surgical castration.

Claim 38. (Withdrawn): The method of claim 30, wherein the sex steroid-mediated signaling to the thymus is disrupted by chemical castration.

Claim 39. (Previously Presented): The method of claim 30, wherein the sex steroid-mediated signaling to the thymus is disrupted by administration of a pharmaceutical.

Claim 40. (Previously Presented): The method of claim 39, wherein the pharmaceutical is selected from the group consisting of LHRH agonists, LHRH antagonists, anti-LHRH vaccines, anti-androgens, anti-estrogens, SERMs, SARMs, SPRMs, ERDs, aromatase inhibitors, anti-progestogens, Dioxalan derivatives and combinations thereof.

Claim 41. (Currently Amended): The method of claim 40, wherein the LHRH agonists are selected from the group ~~selected from the group~~ consisting of Goserelin, ~~Lupron~~ LUPRON®, Leuprolide, Triptorelin, ~~Meterelin~~ METERELIN®, Buserelin, Histrelin, Nafarelin, Lutrelin, Leuprorelin, Deslorelin, ~~Cystorelin~~ CYSTORELIN®, Decapeptyl, Gonadorelin, and combinations thereof.

Claim 42. (Previously Presented): The method of claim 39, wherein the pharmaceutical is selected from the group consisting of Abarelix, Cetrorelix, and combinations thereof.

Claim 43. (Previously Presented): The method of claim 15, wherein patient's immune response to the vaccine antigen is improved compared to that immune response which would have otherwise occurred in a patient prior to thymus reactivation.

Claim 44. (Previously Presented): The method of claim 15, wherein the vaccine is a therapeutic vaccine or a prophylactic vaccine.

Claim 45. (Previously Presented): The method of claim 15, wherein the vaccine antigen is an antigen from an agent, wherein the agent is selected from the group consisting of a virus, a bacterium, a fungus, a parasite, a prion, a cancer, an allergen, an asthma-inducing agent, a "self" protein and an antigen which causes an autoimmune disease.

Claim 46. (Previously Presented): The method of claim 45, wherein the agent is a virus.

Claim 47. (Previously Presented): The method of claim 46, wherein the virus is selected from the group consisting of Retroviridae, Picornaviridae, Calciviridae, Togaviridae, Flaviridae, Coronaviridae, Rhabdoviridae, Filoviridae, Paramyxoviridae, Orthomyxoviridae, Bungaviridae, Arenaviridae, Reoviridae, Birnaviridae, Hepadnaviridae, Parvoviridae, Papovaviridae, Adenoviridae, Herpesviridae, Poxviridae, and Iridoviridae.

Claim 48. (Previously Presented): The method of claim 46, wherein the virus is selected from the group consisting of influenza virus, human immunodeficiency virus, and herpes simplex virus.

Claim 49. (Previously Presented): The method of claim 45, wherein the agent is a bacterium.

Claim 50. (Previously Presented): The method of claim 41, wherein the bacterium is selected from the group consisting of *Helicobacter pylori, Borelia burgdorferi, Legionella pneumophilia, Mycobacterium tuberculosis, Mycobacterium avium, Mycobacterium intracellulare, Mycobacterium kansaii, Mycobacterium gordonae, Mycobacteria* sporozoites, *Staphylococcus aureus, Neisseria gonorrhoeae, Neisseria meningitidis, Listeria monocytogenes, Streptococcus pyogenes, Streptococcus agalactiae, Streptococcus faecalis, Streptococcus bovis, Streptococcus pneumoniae,* pathogenic *Campylobacter* sporozoites, *Enterococcus* sporozoites, *Haemophilus influenzae, Bacillus anthracis, Corynebacterium diphtheriae, Corynebacterium* sporozoites, *Erysipelothrix rhusiopathiae, Clostridium perfringens, Clostridium tetani, Enterobacter aerogenes, Klebsiella pneumoniae, Pasturella multocida, Bacteroides* sporozoites, *Fusobacterium nucleatum, Streptobacillus moniliformis, Treponema pallidium, Treponema pertenue, Leptospira,* and *Actinomyces israelli.*

Claim 51. (Previously Presented): The method of claim 49, wherein the bacterium is a mycobacterium.

Claim 52. (Previously Presented): The method of claim 45, wherein the agent is a parasite.

Claim 53. (Previously Presented): The method of claim 52, wherein the parasite is selected from the group consisting of *Plasmodium falciparum*, *Plasmodium yoelli*, and *Toxoplasma gondii*.

Claim 54. (Previously Presented): The method of claim 52, wherein the parasite is a malaria parasite.

Claim 55. (Previously Presented): The method of claim 45, wherein the agent is an infectious fungus.

Claim 56. (Previously Presented): The method of claim 55, wherein the infectious fungus is selected from the group consisting of *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Coccidioides immitis*, *Blastomyces dermatitidis*, *Chlamydia trachomatis*, *Candida albicans*.

Claim 57. (Previously Presented): The method of claim 45, wherein the agent is a cancer or tumor.

Claim 58. (Previously Presented): The method of claim 57, wherein the cancer is selected from the group consisting of a cancer of the brain, a cancer of the lung, a cancer of the ovary, a cancer of the breast, a cancer of the prostate, a cancer of the colon, a cancer of the blood, a carcinoma, a melanoma and a sarcoma.

Claim 59. (Previously Presented): The method of claim 45, wherein the agent is an allergen.

Claim 60. (Previously Presented): The method of claim 59, wherein the allergen causes an allergic condition selected from the group consisting of eczema, allergic rhinitis, allergic coryza, hay fever, bronchial asthma, urticaria (hives), and food allergies.

Claims 61-62. (Cancelled)

Claim 63. (Previously Presented): The method of claim 15, wherein the vaccine is selected from the group consisting of killed vaccines, inactivated vaccines, attenuated vaccines, recombinant vaccines, subunit vaccines, and DNA vaccines.

Claim 64. (Previously Presented): The method of claim 15, wherein the vaccine is administered when the thymus begins to reactivate.

Claim 65. (Previously Presented): The method of claim 30, wherein the vaccine is administered at the time disruption of sex steroid-mediated signaling to the thymus is begun.

Claim 66. (Previously Presented): The method of claim 15, further comprising administering a cytokine, a growth factor, or a combination of a cytokine and a growth factor to the patient.

Claim 67. (Previously Presented): The method of claim 66, wherein the cytokine is selected from the group consisting of Interleukin 2 (IL-2), Interleukin 3 (IL-3), Interleukin 4 (IL-4), Interleukin 6 (IL-6), Interleukin 7 (IL-7), Interleukin 15 (IL-15), Interferon gamma (IFN-γ), and combinations thereof.

Claim 68. (Previously Presented): The method of claim 66, wherein the growth factor is selected from the group consisting of members of the epithelial growth factor family, members of the fibroblast growth factor family, stem cell factor, granulocyte colony stimulating factor (G-CSF), keratinocyte growth factor (KGF), insulin-like growth factor-1 (IGF-1), and combinations thereof.

Claims 69-71. (Cancelled)

Claim 72. (Withdrawn): A method for enhancing transplantation of donor hematopoietic stem cells into the thymus of a recipient patient, comprising:

depleting the T cells of the patient;

reactivating the thymus of the patient; and

transplanting donor hematopoietic stem cells to the patient,

wherein uptake of the donor hematopoietic stem cells into the patient's thymus is enhanced as compared to the uptake that would have otherwise occurred in a patient prior to thymus reactivation.

Claim 73. (Withdrawn): A method for increasing virus-specific peripheral T cell responsiveness of a patient with an at least partially atrophied thymus, comprising:

reactivating the thymus of the patient;

exposing the patient to a virus; and

determining the virus-specific peripheral T cell responsiveness in the patient,

wherein the patient has an increased viral-specific peripheral T cell responsiveness as compared to the responsiveness that would have otherwise occurred in a patient prior to thymus reactivation.

Claim 74. (Withdrawn): The method of claim 30, wherein the sex steroid-mediated signaling to the thymus is disrupted by lowering the level of sex steroid hormones.

Claim 75. (Previously Presented): The method of claim 15, wherein the method further comprises administering an adjuvant to the patient.

Claim 76. (Previously Presented): The method of claim 40, wherein the anti-androgen is Eulexin or ketoconazole.